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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/642,611	08/19/2003	Toshitaka Aoyagi	402761	2829
23548	7590	06/02/2005		EXAMINER
LEYDIG VOIT & MAYER, LTD			VAN ROY, TOD THOMAS	
700 THIRTEENTH ST. NW				
SUITE 300			ART UNIT	PAPER NUMBER
WASHINGTON, DC 20005-3960			2828	

DATE MAILED: 06/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/642,611 <i>TM</i> Tod T. Van Roy	AOYAGI ET AL. <i>TM</i>	Art Unit 2828

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on \_\_\_\_\_.
- 2a) This action is FINAL.                  2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-9 is/are pending in the application.
  - 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-9 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 19 August 2003 is/are: a) accepted or b) objected to by the Examiner.
 

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    - a) All    b) Some \* c) None of:
      1. Certified copies of the priority documents have been received.
      2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
      3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | Paper No(s)/Mail Date: _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>08/19/2003</u> . | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|   | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

***Priority***

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

***Drawings***

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: Fig.1 and 3-6 #4, 5, 7, 11, 12, 13; Fig.7 #4, 5, 11, 12, 13. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claim 9, it is unclear as to the direction in which the effective index of the device is being calculated. The examiner has taken the meaning of this calculation to be in a direction extending from facet 1 towards facet 2, i.e. in the longitudinal direction.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 4, 5, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al. (US 5020072) in view of Lo (US 5617436).

With respect to claim 1, Abe teaches a refractive index coupling distributed feedback (DFB) semiconductor laser comprising a phase-shift structure (col.11 lines 62-68), wherein when viewed from an almost central portion in a light distribution direction in a region in which diffraction gratings are located, an average coupling coefficient  $k_2$  of a diffraction grating on one end face side (fig.7 right side) is smaller than an average coupling coefficient  $k_1$  of a diffraction grating on the other end face side (fig.7 left side) (col.12 lines 4-10). Abe does not teach the coupling coefficients to be greater than 100cm<sup>-1</sup>. Lo teaches a DFB semiconductor laser device (fig.1) in which the coupling coefficients are greater than 100cm<sup>-1</sup> (col.4 lines 11-21). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB laser of Abe with the large coupling coefficients of Lo in order to increase resonator feedback, utilizing more gain, and allow for the reduction of the laser spot size (col.4 lines 22-25).

With respect to claim 4, Abe and Lo teach the DFB device outlined in the rejection to claim 1 and further teach a phase shift structure to located at an almost central portion of the resonator (col.11 lines 62-68).

With respect to claim 5, Abe and Lo teach the DFB device outlined in the rejection to claim 1 and further teach the sum of the phase shift structures to almost equal half of the grating period (half of the grating period corresponds to a  $\lambda/4$  or  $\pi/2$  phase shift, and since there is only 1 phase shift element, this condition is met).

With respect to claim 8, Abe and Lo teach the DFB device outlined in the rejection to claim 1 and further teach changing the coupling coefficients,  $k_1$  and  $k_2$ , via

changing a thickness of a low refractive index layer between that of the active region and the high index grating portion (fig.7, col.11 lines 49-57).

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al. in view of Lo and further in view of Lu et al. ("High Power and High Speed Performance of 1.3um Strained MQW Gain Coupled DFB Lasers," IEEE JQE, Vol.1, No.2 1995, pgs.375-381).

With respect to claim 2, Abe and Lo teach the DFB device outlined in the rejection to claim 1, but do not teach the device to use complex coupling, and have the real part of a coupling coefficient be at least 4 times an imaginary part of a coupling coefficient. Lu teaches a complex coupled DFB laser in which a real part of a coupling coefficient is at least 4 times an imaginary part of a coupling coefficient (Fig.2, col.3 lines 22-29, where the figure and text describe utilizing real and imaginary components of ratios less than 25%). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB laser of Abe and Lo with the complex coupling of Lu in order to have less sensitivity to external reflections (Lu, col.1 lines 14-20) and to provide for enhanced single mode operation (Lu, col.3 lines 24-29).

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al. in view of Lo and further in view of Huang (US 6574261).

With respect to claim 3, Abe and Lo teach the DFB device outlined in the rejection to claim 1, but do not teach the device to include a plurality of phase shift

structures. Huang teaches a DFB semiconductor laser utilizing multiple phase shift structures (fig.9). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB laser of Abe and Lo with the multiple phase shift structures of Huang in order to uniformly distribute carriers and reduce spatial hole burning (Huang, col.12 lines 47-50).

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al. in view of Lo and further in view of Takahashi et al. (US 5727015).

With respect to claim 6, Abe and Lo teach the DFB device outlined in the rejection to claim 1, but do not teach the device to have a higher duty in the k1 region than in the k2 region. Takahashi teaches DFB semiconductor laser in which the duty of the gratings is examined based on coupling coefficient values (fig.3a, in which it can be understood that a high coupling region, k1, could have a larger duty than a low coupling region, k2). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB laser of Abe and Lo with the high to low duty values of Huang in order to appropriately couple the E-field to a desired grating region.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al. in view of Lo and further in view of Ohkura et al. (US 5386433).

With respect to claim 7, Abe and Lo teach the DFB device outlined in the rejection to claim 1, but do not teach the device to have more high refractive layers in the k1 region than in the k2 region. Ohkura teaches a semiconductor laser comprising a

grating in which a high coupling region contains more high index gratings than a low coupling region (fig.2 high coupling 61, low coupling 62; col.5 lines 9-32). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB laser of Abe and Lo with the grating organization of Ohkura in order to control which device region light is most coupled to (Ohkura, col.5 lines 19-22).

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al. in view of Lo and further in view of Weber (US 5379318).

With respect to claim 9, Abe and Lo teach the DFB device outlined in the rejection to claim 1, but do not teach the device to satisfy the relationship that the effective index through grating2 times the period of grating2 be almost equal to the effective index of grating1 times the period of grating1. Weber teaches a semiconductor laser in which an effective index through a grating2 times the period of a grating2 be almost equal to the effective index of a grating1 times the period of a grating1 (fig.1 #G1,G3; the effective index of G3 would be greater than that of G1 due to the larger amount of high index grating material, but the period of G1 would be greater than that of G3 in order to correctly fit the relationship shown in fig.2, this leads to the approximate balancing of  $NeffG1 * PeriodG1$  almost equal to  $NeffG3 * PeriodG3$ ). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB laser of Abe and Lo with the grating structure of Weber in order to allow for a degree of wavelength selectivity (Weber, abs. lines 2-5).

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tod T. Van Roy whose telephone number is (571)272-8447. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TVR

*[Handwritten signature]*  
MINSUN CHI HARVEY  
PRIMARY EXAMINER